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Quantum-corrected ultraextremal horizons and the validity of the WKB approximation in the massless limit

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Abstract

We consider quantum backreaction of the quantized scalar field with an arbitrary mass and curvature coupling on ultraextremal horizons. The problem is distinguished in that (in contrast to nonextremal or extremal black holes) the WKB approximation remains valid near r+ (which is the radius of the horizon) even in the massless limit. We examine the behavior of the stress-energy tensor of the quantized field near r+ and show that quantum-corrected objects under discussion do exist. In the limit of the large mass our results agree with previous ones known in literature. © 2007 The American Physical Society.

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